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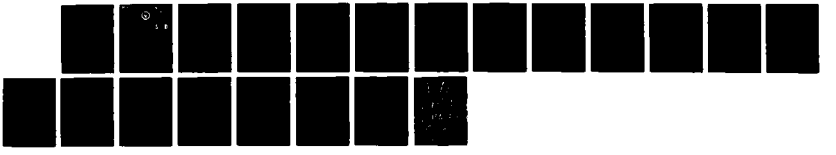
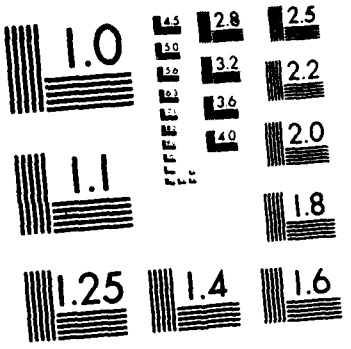




DEPARTMENT OF DEFENSE
STATEMENT ON
THE TECHNOLOGY BASE

BY

DR. ROBERT C. DUNCAN
DIRECTOR, DEFENSE RESEARCH AND ENGINEERING

TO

THE SUBCOMMITTEE ON DEFENSE INDUSTRY AND TECHNOLOGY

OF THE

COMMITTEE ON ARMED SERVICES
UNITED STATES SENATE
100TH CONGRESS, SECOND SESSION

MARCH 18, 1988

Good morning, Mr. Chairman, members of the Subcommittee, I am Robert C. Duncan, the Director, Defense Research and Engineering. Though I've worked with members of this subcommittee before in my previous position as Director of the Defense Advanced Research Projects Agency (DARPA), this is my first opportunity to appear before you as the Director, Defense Research and Engineering. Because of that I would like to begin my remarks with an overview of the DDR&E organization followed by a discussion of Technology Base topics you requested in your letter of February 26, 1988. I will close my statement with a summary of the FY 1989 Technology Base request.

Organization

On organizational issues, you know that in 1986 the Packard Commission recommended (and Congress responded with implementing legislation) the creation of the position of the Director of Defense Research and Engineering within the new Office of the Under Secretary of Defense for Acquisition. The DDR&E is the principal advisor and assistant to the Secretary of Defense and the Under Secretary for Acquisition for matters involving R&D. In December of last year, the Senate confirmed my nomination to be DDR&E. I report to Dr. Robert Costello, the Under Secretary of Defense for Acquisition. Organizationally, I am responsible for strategic and theater nuclear forces, tactical warfare

programs, international programs and technology, research and advanced technology, and developmental test and evaluation. In addition, Dr. Costello has also delegated DDR&E oversight responsibilities for the Defense Advanced Research Projects Agency and the Defense Nuclear Agency. My remarks today will be limited to my research and advanced technology program responsibilities.

Selection of Technology Base Programs under a Constrained Budget

Secretary Carlucci has spoken of the increased risks inherent in lowering the level of resources we devote to defense when there is no corresponding reduction of our responsibilities around the world. The relationship between smaller budgets, increased responsibilities, and greater risks is easy to establish if one thinks about the consequences of reducing the force structure, terminating weapon systems, or delaying procurements. I believe, however, that the risk becomes less clear and therefore easier to ignore when we talk about the consequences of deferring technology investments for the future. As a technology manager for a number of years, I am particularly sensitive to the investments required now for payoffs in the mid- to long-term future.

Central to planning and execution of a viable technology base program is the definition of projects and programs to be

undertaken. It is prudent and necessary that the DoD conduct a broad technology base program in areas of special needs that are not otherwise available from industry, academia, and non-DoD government laboratory sources. Much of this activity is evolutionary and plays a very necessary role in the formulation of our future technological posture. In addition, there is a need to identify and emphasize technologies that provide the high leverage needed to enhance deterrence.

This need to identify highly leveraged technologies has always been important. In my judgment, it becomes even more so in the context of nuclear arms control or even essential nuclear equivalence. As we think about conventional defense improvements and the prospects for conventional arms control, we are led inevitably to the requirement for identifying the technology or technologies that will, for example, render tank armies impotent and obsolete. For example, the Balanced Technology Initiative program is oriented toward accelerated development of technologies that "will make a difference" in our conventional capabilities. To a large degree, we will have to rely on "leap frogging" technologies to make up for our numerical inferiority and to give the Soviets an incentive to agree to meaningful conventional arms control.

The selection of high leverage technologies that are to be emphasized depends upon a combination of factors. The threat,

military need, adversary weakness, technological advancement, and innovative judgment all play a role in the formulation of an investment strategy. Also, our sources for information and recommendations are varied. The Defense Science Board and other similar bodies provide sound advice on high payoff strategies; the Joint Staff and Services are excellent at translating technology to the solution of military problems; the government laboratory-industry-university team is a large and innovative source of ideas; and our technical staffs all are important in the formulation of a technological strategy for the Department. I consider the high quality and depth of the nation's entire technology base to be a great national asset that is important for us to encourage and nourish at every opportunity.

Coordination of Technology Base Programs

One of my prime functions is to ensure coordination of technology programs of the Services and the Defense Agencies. First, I strongly believe that every scientist, engineer and R&D manager has, as part of his normal duties, the responsibility for assuring that his work is in harmony with other work in his field or technical interest area. The data banks, documentation centers, analysis centers, professional societies and literature are tools to assist individuals and organizations in accomplishing this important task. Within DDR&E, special procedures are undertaken to enhance technology coordination.

In addition to normal face-to-face meetings, symposia, budget and program formulation activities, the staff conducts a three-tiered series of reviews both to coordinate Service and Defense Agency projects and to gain insight into formulation of an investment strategy. At the staff level, annual science and technology reviews are conducted on a tri-Service basis by responsible professional staff members covering specific technology interest areas. About 25 reviews are carried out in areas such as chemical defense, combat vehicles, aeronautics and aircraft propulsion. At the Service level, with Deputy Under Secretary and senior Service personnel participation, investment strategy reviews are conducted to ascertain program adequacy and to determine directions for the future. And finally, for a specific and often narrow technical area, topical reviews are held as required. The subject matter is covered in great detail and attendance is relatively large. Topical reviews serve both a coordination and educational function. We plan to continue and improve upon this comprehensive review process.

DoD Laboratories

Since the founding in 1842 of the first defense laboratory, the Naval Observatory, the United States has been well served by defense laboratories in the conduct of innovative research as well as in the support of operational forces by laboratory

personnel during national emergencies. The laboratories are a key element in development and execution of the Defense Technology Base program. Scientists and engineers in the laboratories perform 32% of the Basic Research Program (6.1) and 43% of the Exploratory Development (6.2) Program. Further, they are responsible for administering, through contracts, the major portion of the five billion dollar annual technology base effort.

The accomplishments and contributions of the DoD laboratories are universally recognized. For example, they have pioneered the field of night vision devices, maintained U.S. preeminence in aircraft jet engines, and developed the world's quietiest and most survivable submarines. These contributions have been accomplished because of the high quality and energy of the scientists and engineers in the laboratories who have worked in a supportive environment set up by enlightened management. We are concerned about maintaining that quality in the future, particularly as the Civil Service compensation and employment policies degenerate compared to the private sector. Accordingly, maintaining the quality of the laboratories was the central focus of the Defense Science Board (DSB) 1987 Summer study on Management of the Technology Base. We will be pleased to submit the summer study final report for the record; however, I would like to summarize a few of the key recommendations and our plans for implementing them.

In the important area of scientific and engineering personnel, the DSB recommended extending the China Lake personnel system demonstration to all DoD Laboratories; and increasing the tenure, responsibility, authority and accountability of laboratory directors to a five-year term; and giving these directors greater procurement and allocation authority. Secondly, each Service is to select one laboratory to serve as a demonstration project designed to:

- o Attract and retain highest quality staff.
- o Improve contracting effectiveness.
- o Improve personnel management.
- o Provide local laboratory management of authority and accountability.

Implementation of the above recommendations requires a range of activities from internal policy statements to significant legislation. To spearhead this effort, we are forming an interagency task force, which I will chair. The task force will include members from OMB, OPM and OSTP as well as cognizant offices in DoD. We have laid out an ambitious schedule and plan to have a legislative package by late summer.

Technology Transition

The second important subject addressed in the summer study was improving the transition of technology from the laboratory to

new or existing weapon systems. As you know, reducing technology lead time is one of Dr. Costello's ten strategies for improving the acquisition process. The DSB recommended the establishment of Advanced Technology Transition Demonstrations (ATTD) within the Advanced Technology Development (6.3A) program. The principal objective of the ATTDs is to build and test experimental systems in a field environment before system commitment and full-scale engineering development decisions are made, but with participation by the users.

The summer study recommended the application of selection criteria and management principles that have proven effective during past technology development and demonstration efforts and developed these in great detail in their report. The DSB recommended that, by 1991, at least half or more of the 6.3A funds be directed to ATTD projects and that ATTD projects be reviewed by the Vice Chairman of the JCS annually to ensure that projects address user needs.

Implementation of the ATTD recommendations as well as development of additional concepts to enhance technology transition will be guided by a working group that has been established under the auspices of the Science and Technology Committee, one of the ten Defense Acquisition Board standing committees. The working group will identify those 6.3A projects which are currently being pursued as ATTDs, those which can be

altered to conform to ATTD guidelines, and candidates for future ATTD projects.

Department of Energy (DoE) Laboratories

The DoE laboratories conduct sound and extensive research and development programs important to national security. Their contributions to the development and maintenance of our nuclear weapons capabilities are well known. Less familiar are the many other contributions of DoE laboratories to national defense. Included in this category are achievements in explosives, advanced munitions, armor, materials, high power microwaves, communications, power and system analysis. This work is important to both the strategic and conventional warfare needs of the country, and well over $500 million of non-nuclear weapons R&D is performed by DoE for DoD.

As part of ongoing efforts to maintain a valuable and productive relationship with the national scientific and technology community, we intend to continue active liaison with the national laboratories and pursue new opportunities for collaboration in effectively carrying out defense programs.

Independent Research and Development

Independent Research and Development (IR&D) is the company-selected, company-sponsored technical effort necessary to remain

competitive in a technological environment. The DoD recognizes IR&D charges to overhead as a necessary cost of doing business with its contractors. Through recognition of the independent nature of IR&D efforts, we seek to encourage innovative concepts that broaden and complement those being developed internal to the DoD, to stimulate competition, and to contribute to the economic stability of its contractors by allowing them to develop a broad base of technical products.

IR&D is a strongly leveraged program providing significant enhancement of the science and technology program. A recent independent study (conducted by RAND) found that, in the long term, for each additional dollar DoD allows in the ceiling negotiated with a company, industry responds by spending two dollars to perform additional R&D in the cost centers which have ongoing business with DoD. In addition, RAND found that for the same dollar invested by DoD, industry increases by 75 cents the amount it spends on R&D in cost centers that have no business with DoD. Thus, DoD's IR&D support benefits not only DoD directly but also broadens the nation's technology base as a whole.

We are working with industry to streamline the administration and execution of the program. We have developed a review and oversight cycle which spans two years rather than the current annual requirement, without reducing significantly the

visibility of the technical effort and its quality. This review will be accomplished by requiring annual updates on projects which have experienced major changes, while permitting more stable projects to run for two years. The benefit of this approach is that the administrative effort, and cost, to prepare technical review documents are reduced. In a similar vein, we are beginning to review the program with a view toward streamlining the process and ensuring fairness towards our contractors. We plan to present our findings and recommendations to Congress in the near future.

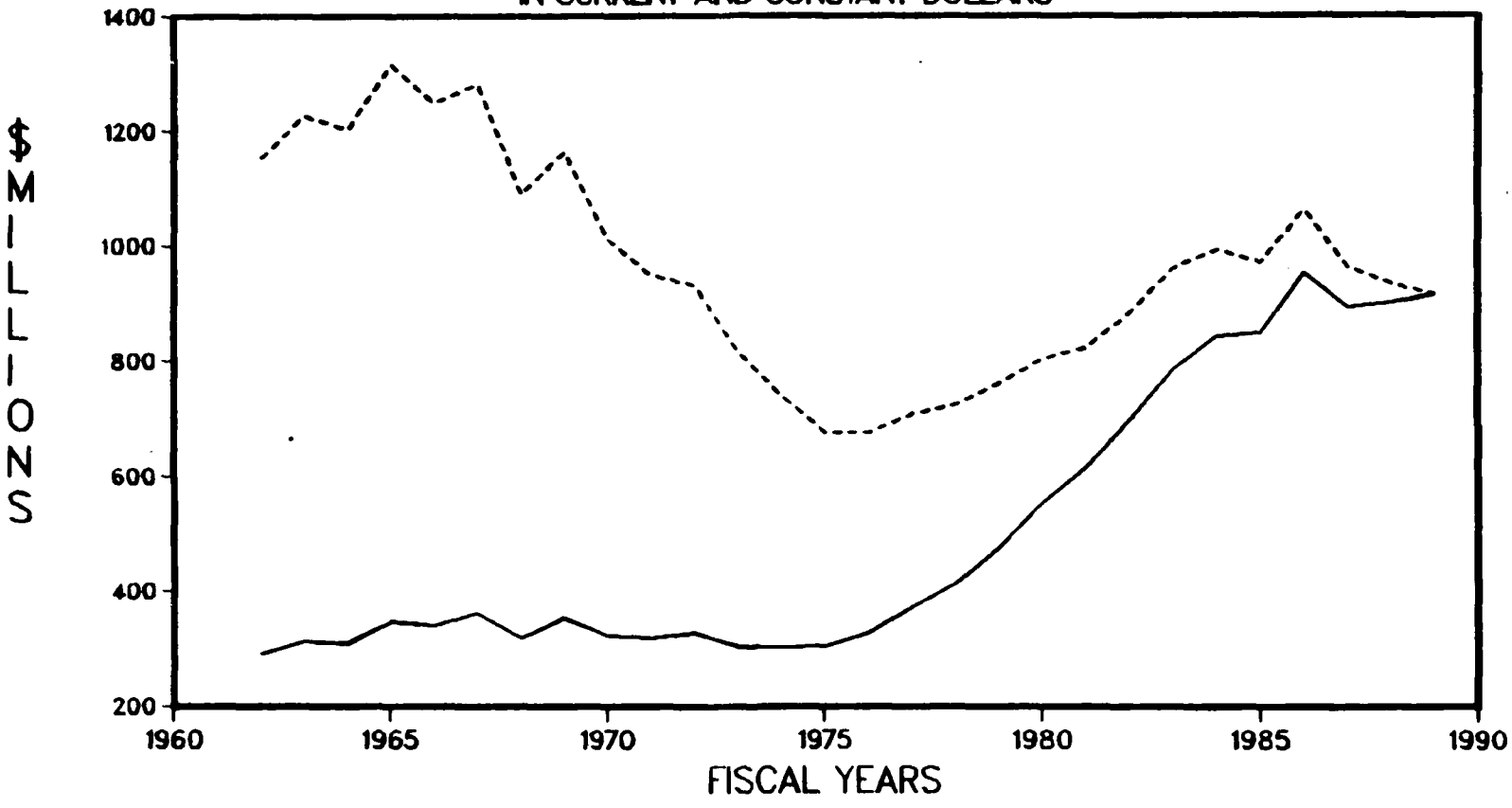
Budget Highlights

As you know, Secretary Carlucci gave guidance and established priorities for the crafting of this amended budget. His overall guidance was the choice of a smaller force fully ready as opposed to a larger, but unready force. His priorities were people, readiness, and efficient acquisition. Our original technology base request in the FY 1988/89 biennial budget was for $5,866 million in FY 1989. As a result of the recent amendment process, we have reduced that request by about $603 million to $5,263 million. Technology base funding trend curves requested by this committee are attached.

We believe the FY 1989 Amended Budget provides a reasonable balance between resources to protect us today and resources to

ensure our future deterrent capabilities. At the same time, however, we also recognize the risks, both present and future, inherent in declining resources for defense. Within DDR&E, we are doing and will do our best to see that those resources are effectively managed so that we get the most leverage possible from the scarce resources available.

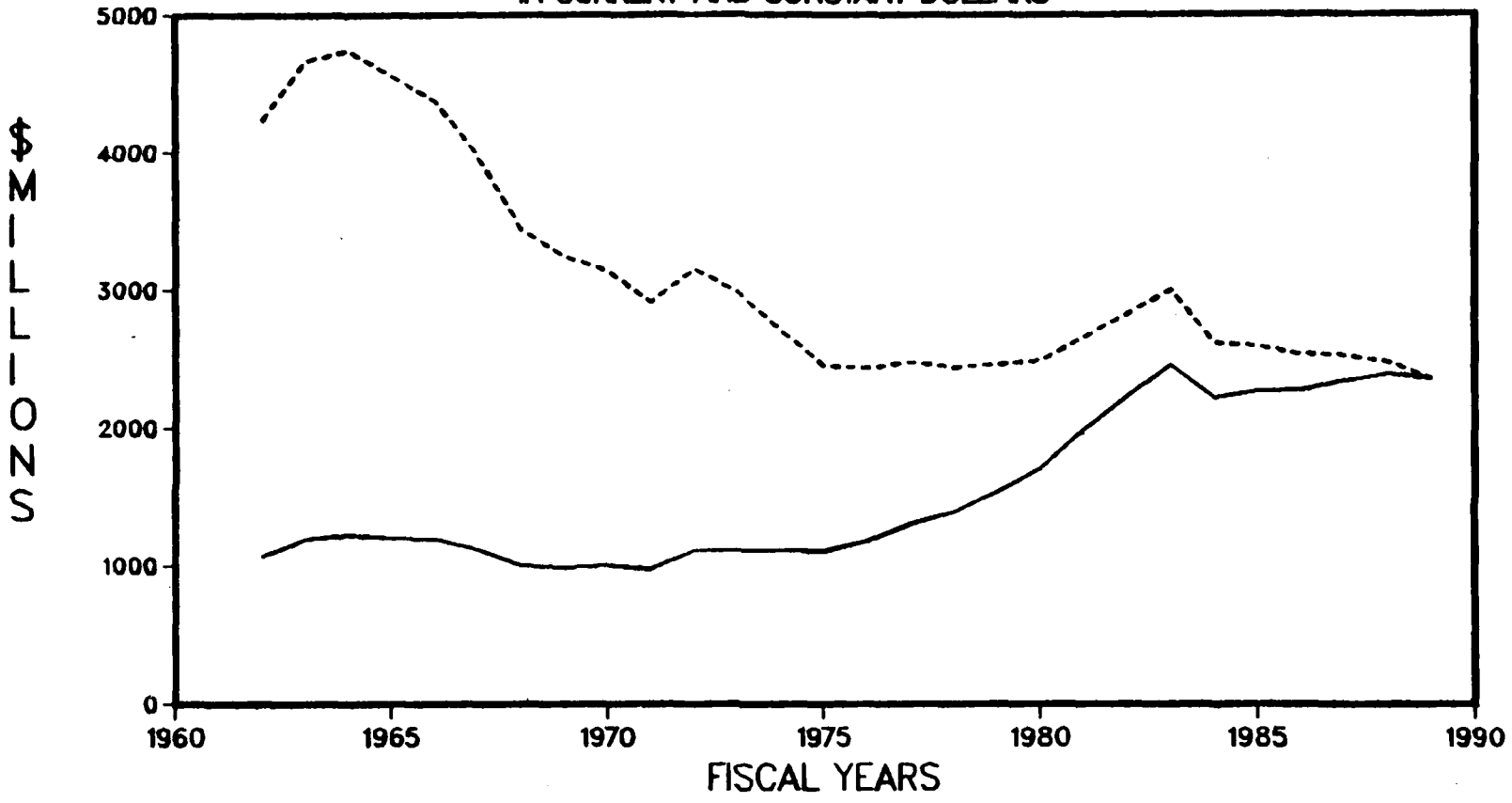
SCIENCE AND TECHNOLOGY TREND
DOD 6.1
IN CURRENT AND CONSTANT DOLLARS



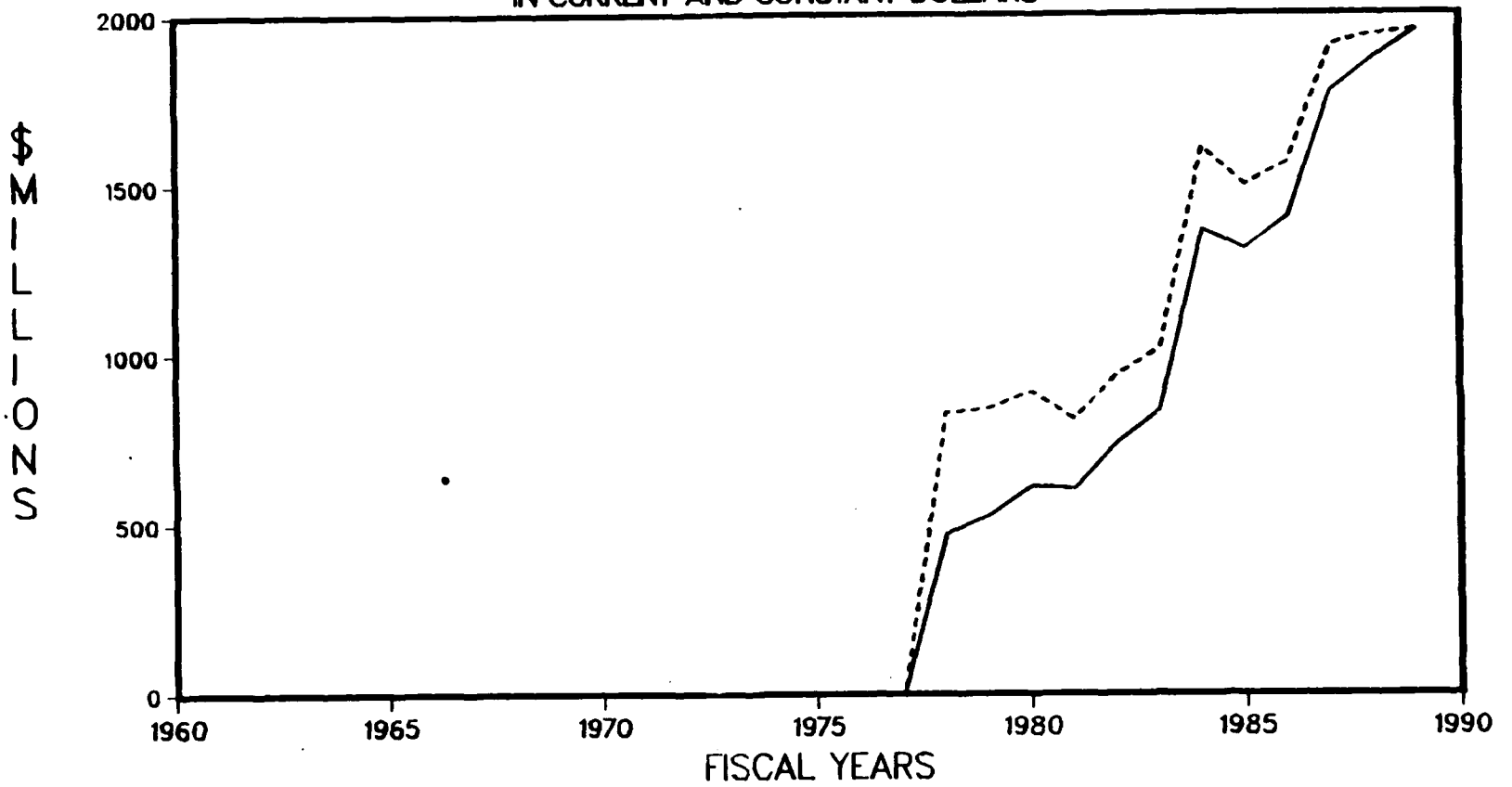
SCIENCE AND TECHNOLOGY TREND

DOD 6.2

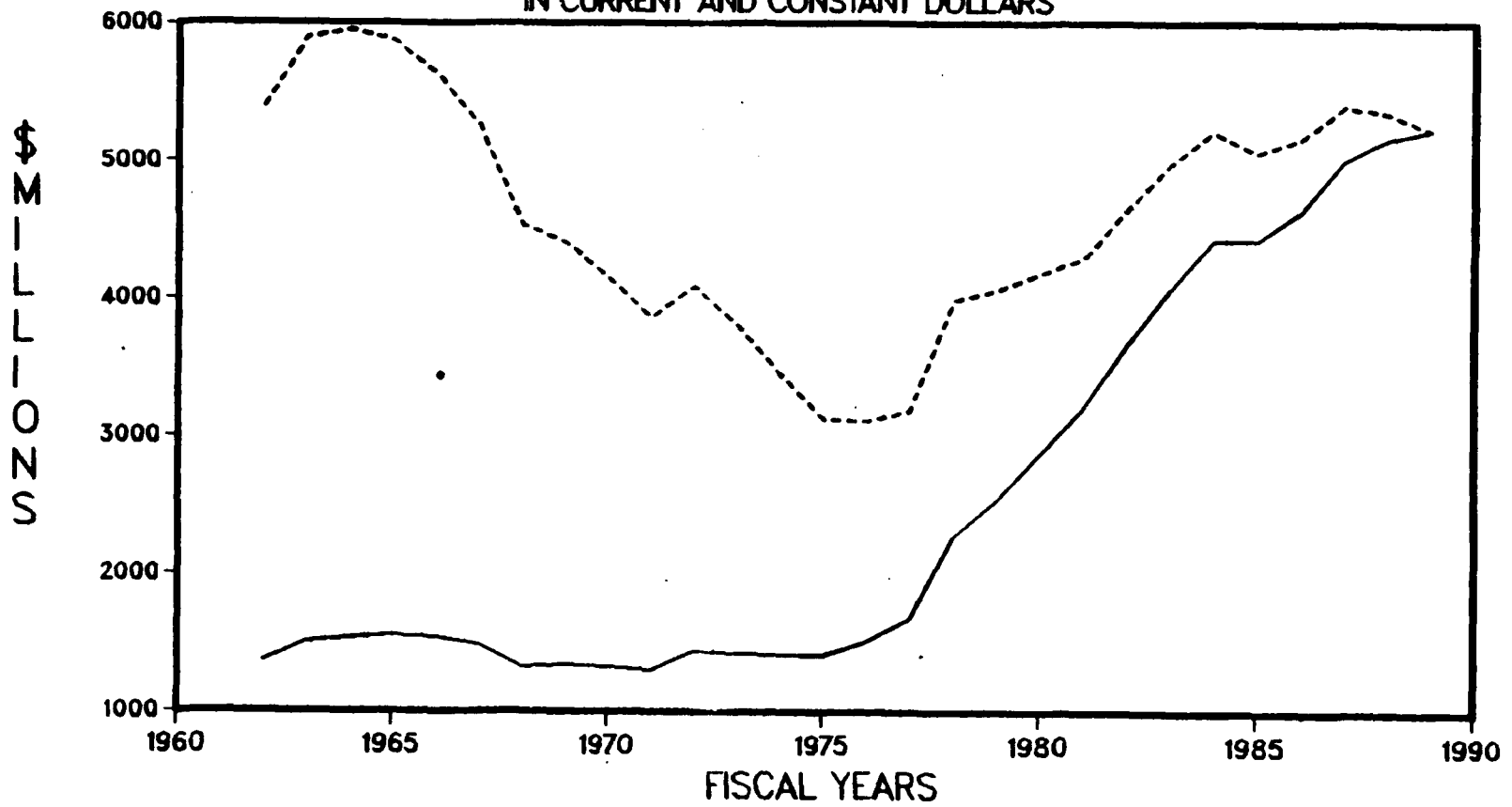
IN CURRENT AND CONSTANT DOLLARS



SCIENCE AND TECHNOLOGY TREND
DOD 6.3A W/O SDI
IN CURRENT AND CONSTANT DOLLARS



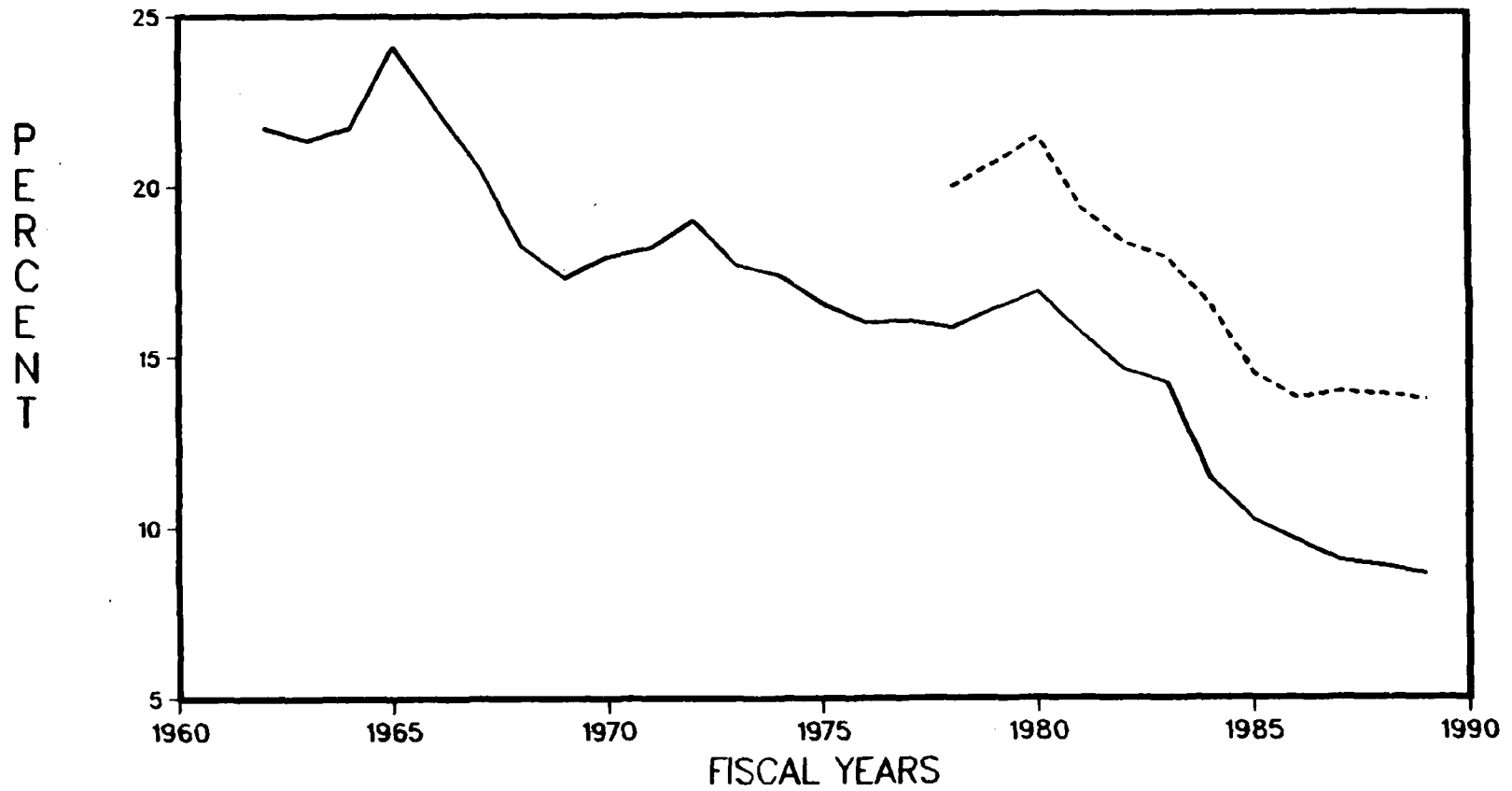
SCIENCE AND TECHNOLOGY TREND
DOD 6.1 + 6.2 + 6.3A W/O SDI
IN CURRENT AND CONSTANT DOLLARS



DoD 6.1+6.2+6.3A W/O SDI Current

DoD 6.1+6.2+6.3A W/O SDI Constant

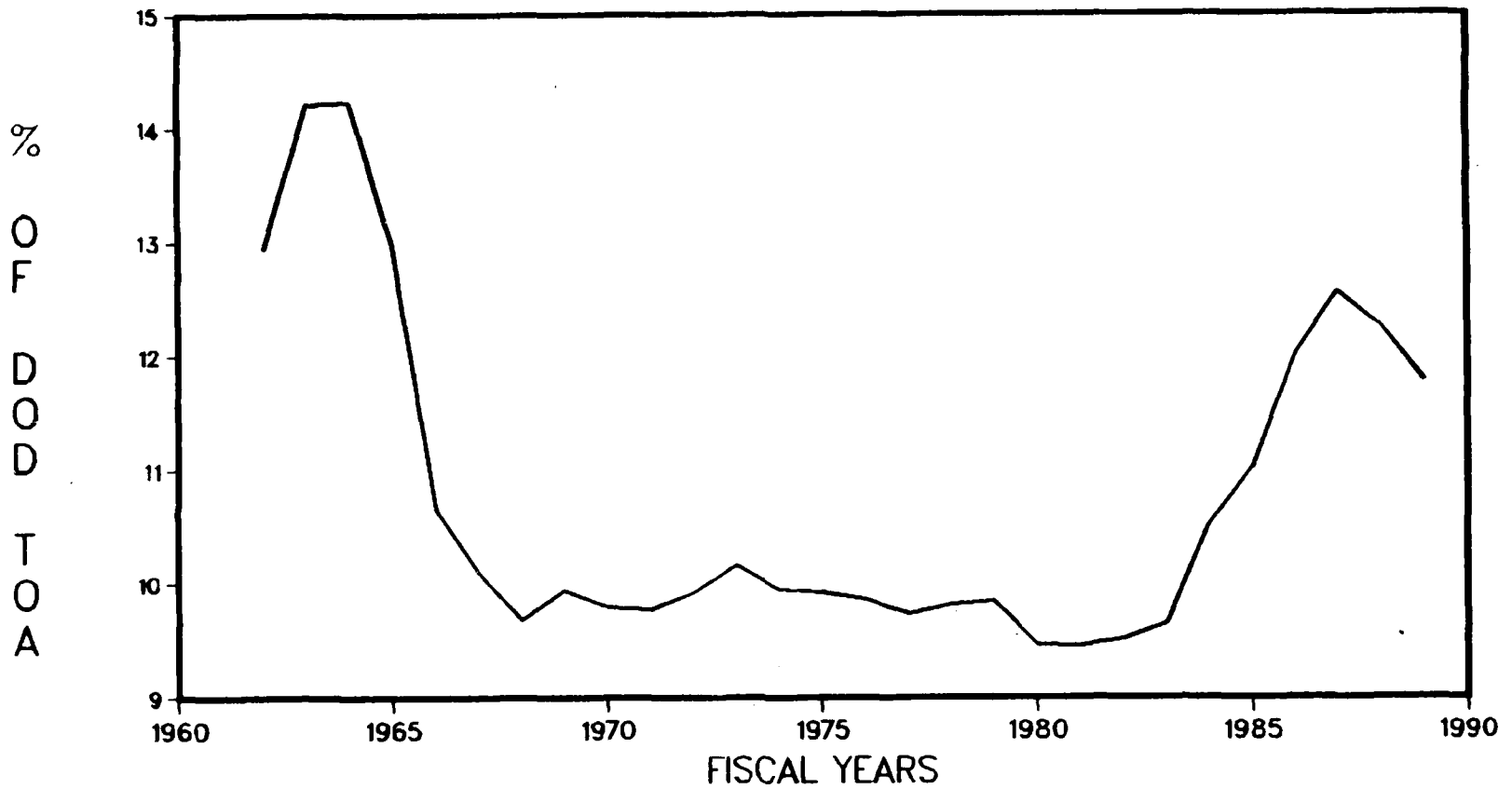
SCIENCE AND TECHNOLOGY TREND
TECHNOLOGY BASE AS A % OF DOD RDT&E



DoD 6.1+6.2 % of DoD RDT+E

DoD 6.1+6.2+6.3A w/o SDI % of DoD RDT+E

RESEARCH, DEVELOPMENT, TEST AND EVALUATION TRENDS
PERCENTAGE OF DOD TOA



RDTE % of DoD

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